1894MNRAS..54..404.

The following were proposed by the Council as Associates of the Society :—

Albert A. Michelson, University of Chicago, U.S.A. ;
H. Poincaré, Paris.

Seventy-six presents were announced as having been received since the last meeting, including amongst others a series of lantern slides from photographs taken at Sydney Observatory, presented by H. C. Russell.

Report of the Joint Solar Eclipse Committee of the Royal Society, the Royal Astronomical Society, and the Solar Physics Committee, for the observation of the Solar Eclipse of 1893 *April* 16.

(*Communicated by Dr. A. A. Common, Secretary of the Committee.*)

The Committee has done the work which it was constituted to do, and now submits the following Report to the above-mentioned Societies :—

This Committee was formed early in 1892 by the addition to the already constituted Committee of the Royal Astronomical Society of eighteen members nominated by the Royal Society and of eight members nominated by the Solar Physics Committee. Some of the members thus nominated were already members of the old Committee. The original number of the Joint Committee was thirty-two. One new member has been added.

The Committee has to regret the death of two of its members—the Rev. Professor Pritchard, F.R.S., and Mr. H. T. Blandford, F.R.S.

The first meeting of the Committee was held on 1892 May 27, followed by three others on June 17, November 23, and 1893 January 25. At these meetings the work to be undertaken was determined upon and the observers selected; and although a careful estimation of the cost of sending two expeditions (one to Africa and one to Brazil) showed that the amount of money applied for from the Government Grant Fund of the Royal Society was not quite enough, the great advantage that would be gained by two such expeditions so widely separated quite warranted the Committee in sending them.

It was therefore decided to send one expedition to West Africa, under the charge of Dr. Thorpe, and another to Pará Curu, in Northern Brazil, under the charge of Mr. A. Taylor, and that the work done at each station should be of the same

1894MNRAS..54..404.

kind. At the African station, however, Dr. Thorpe would undertake, in addition, to make similar observations bearing on the photometric intensity of the coronal light to those he had already made in Grenada in 1886.

The work to be done at each station was :—

1. Photographs of the corona by means of a lens lent by Captain Abney, in continuation of a long series of photographs already obtained at previous eclipses.
2. Photographs of the corona on a larger scale and with a shorter exposure (relatively).
3. Photographs of the surroundings of the Sun, taken by means of a lens with prisms in front.
4. Photographs of the spectrum of the corona with slit spectroscopes.

The work mentioned in the first and second paragraphs above necessitated the construction of a double camera, as it was important to get the two photographs on the different scales taken together. The size of the larger image was about three times that of the smaller. The exposures were arranged so that the longer exposure of the large picture would be comparable with the shorter exposure of the smaller.

Two double tubes were made with dark slides carrying two plates each, and mounted on telescopes lent by the Admiralty.

The work referred to in the third paragraph was undertaken at the suggestion of Mr. Lockyer, who undertook the whole arrangement as to supply of instruments and times of exposure.

The slit spectroscopes in use in Africa were mounted on an equatorial stand lent by the Astronomer Royal. In Brazil the heliostat used for the other spectroscopic work gave the light to fixed spectroscopes.

The Committee were not only very fortunate in getting a sufficient number of observers for the work, but, as events proved, perhaps the very best men that could have been chosen for each class of work.

Dr. Thorpe took charge of the African expedition, and of the work already mentioned to be done by him, and was assisted by Mr. Gray, and also by Mr. Forbes, who went out as a volunteer and at his own cost. The double coronagraph was in charge of Sergeant Kearney, R.E.; Captain E. H. Hills, R.E., who was also a volunteer and went out at his own expense, had charge of the slit spectroscopes; and Mr. A. Fowler, of the Royal College of Science, had charge of the prismatic camera. Mr. A. Taylor took charge of the Brazilian expedition, and was assisted by Mr. Shackleton, who had charge of the prismatic camera there, Mr. Taylor using the double coronagraph and the slit spectroscopes. The selected place of observation on the line of totality was in each case on foreign territory. At the request of the Committee the Royal Society made the necessary application,

1894MNRAS..54..404.

through the Foreign Office, for permission to land and put up instruments, and for other facilities, to the French and Brazilian Governments; this in each case was most kindly accorded.

In Africa the point selected as giving the best chance of fine weather was some distance from the coast up the Salum River, and only to be reached by vessel. The Admiralty kindly placed at the disposal of the expedition a gunboat for this service, which met the expedition at Bathurst, took it to the selected spot near Fundium, attended it there, and brought it back to Bathurst when the eclipse was over.

As the return mail-boat from Bathurst did not leave for some time after the return of the expedition there, the Admiralty kindly placed another vessel at the service of the expedition to bring it on to Teneriffe. The eclipse was observed under very favourable circumstances (only a slight haze prevailing), and the results obtained were most successful in every way.

Except for an over-exposure of one of the slit spectroscopes, not in any way due to Mr. Taylor, who had to rely on volunteer assistance in this, the results obtained by the Brazilian expedition were equally successful.

The observers here had to travel much further; after the voyage to Pernambuco, a coasting voyage to Ceara, and another to Parazinho, with trans-shipment of baggage under considerable difficulties, had to be done. On arrival at Parazinho, the luggage had to be got on shore by native rafts of a very primitive character, and then taken two kilometres up country, to Pará Curu, on bullock waggons. This was accomplished by April 3. The work of getting houses built for the instruments, and the instruments set up and adjusted, was at once begun; and although continual cloud, combined with heavy rain, very much interfered with the work, the whole of the arrangements were completed before the eclipse, and three days of rehearsals were obtained.

The morning of the eclipse was cloudy, and there seemed very little chance of getting any results; but everything was arranged to carry on the operations, and the clouds were anxiously watched for a break. Fortunately this break in the clouds came, and the eclipse was observed under excellent conditions.

Mr. Taylor and Mr. Shackleton must have worked in a most praiseworthy way to have got all ready under such very discouraging circumstances, without any such help as could have been given by a gunboat's crew, which almost seems a necessity when instruments have to be landed on practically a barren shore.

Since the return of the expeditions, the Committee has met, on 1893 June 5, and on January 12 and May 2 of this year, to consider the publication of the reports of the various observers, and to arrange for a settlement of the various accounts for expenses incurred.

With regard to publication, the following arrangements have been made:—Dr. Thorpe is preparing and will send to the Royal Society his report on the work he undertook in Africa. Mr.

1894MNRAS..54..404.

Lockyer has already sent in to the Royal Society a preliminary report on the results obtained with the prismatic cameras in Africa and Brazil. Captain E. H. Hills has prepared, and the Committee has communicated to the Royal Society, a report on the slit spectroscope photographs obtained in Africa and Brazil.

A report on the corona photographs, taken with the double coronagraph by Mr. Taylor in Brazil and Sergeant Kearney in Africa, with a selection of the photographs for reproduction, and a Paper giving the results of a comparison of the various photographs made by Mr. W. H. Wesley, with a view of detecting any change in the form of the corona, is almost ready, and will be presented to the Royal Astronomical Society for publication, in continuation of similar work already published by this Society.

With regard to the cost of the expeditions, this has considerably exceeded the estimates first made as to the probable cost, particularly in the case of the Brazilian expedition, where, from the nature of the case, the expense has been very heavy. The cost of this expedition was 376*l.* 6*s.* 1*d.*; of the African expedition, 279*l.* 0*s.* 8*d.*; of instruments, plates, and sundries, 157*l.* 5*s.* 7*d.*; making a total of 812*l.* 12*s.* 4*d.*

The original grant of the Royal Society from the Government Grant Fund was 600*l.*; this was supplemented by a further grant of 100*l.*, and the Royal Astronomical Society, on the application of the Committee, gave 112*l.* 12*s.* 4*d.*, thus enabling the Committee to pay all expenses incurred.

The accounts for the money spent have been examined by the auditor appointed by the Committee (General Tennant), and certified correct, and will be sent to the Government Grant Committee in due course.

The recently formed Committee of the Royal Society and the Royal Astronomical Society has kindly undertaken to take charge of the photographs and papers in connection with the 1893 eclipse, and to deal with any question that may arise, which would otherwise come before the Joint Committee.

The members of the Committee, in concluding this Report, wish to put on record their thanks to the Admiralty for the services of H.M.S. *Alecto* and H.M.S. *Blonde* in connection with the African expedition; to the French and Brazilian Governments for the facilities afforded to both expeditions; to the Royal Society, the Royal Astronomical Society, and the Solar Physics Committee, and to the Astronomer Royal, Mr. Lockyer, and Captain Abney for the loans of instruments; to the observers who went to Africa and Brazil, whose names are already mentioned in this Report; and for help in other ways to the following gentlemen amongst others :—R. B. Llewellyn, C.M.G., Administrator at Bathurst; M. Victor Allys, Administrator at Fundium; the Directors of the British and African Steamship Company; the Directors of the Spanish National Submarine Telegraph Company; H.E. the Governor of Ceara; Mr. A. T. G. Williams, H.M.'s Acting Consul at Pernambuco; Mr. G. Holdernesse,

1894MNRAS..54..404.

Vice-Consul at Fortaliza; Mr. Reidy, Manager of the Western Brazilian Submarine Telegraph Company; Mr. P. O'Meara, late Chief Engineer of the Port Works, Ceara; M. N. Olsen, Fortaliza, Ceara; Colonel Jas. Brigido, Ceara; and the Directors of the Royal Mail Steamship Company.

1894 *May* 2.

Two Questions on Mr. Stone's Proposed Correction to the Measure of Time. By Professor Simon Newcomb.

From Mr. Stone's note on p. 288 of the *Monthly Notices* for March it would seem that he has not carefully read the short Paper to which his note alludes. This Paper contains no attempt to disprove Mr. Stone's views, nor were any quantities in his theory neglected; on the contrary, the Paper was principally an attempt to apply his theory, as he states it, to the special case of the transit of the Moon observed at Oxford on 1892 January 6, on the supposition that the use of Le Verrier's tables, and the consequent introduction of the new measure of time, commenced in 1892. An inconsistency was found, and Mr. Stone was asked to explain it. He says nothing about this observation, and gives no explanation of the inconsistency. I therefore beg that Mr. Stone will answer these two questions:—

(1) What would have been the tabular error of Hansen's tables of the Moon given by the transit observed at Oxford on 1892 January 6, and printed on p. 4 of the *Monthly Notices* for the present session, if Carlini's tables of the Sun had been continued in use in the *Nautical Almanac* until the present time?

(2) What would have been the tabular error given by the same observation had Carlini's tables been continued until the end of 1891 and Le Verrier's introduced for the first time in 1892?

Either Mr. Stone can answer these very simple questions or he cannot. If he can answer them, I respectfully submit that it is only just to himself that he should do so, giving the numerical computation in each of the two cases fully enough to be understood, comparing it with the actual computation on p. 4, and showing how the result follows from his theory. If he cannot answer them, nothing more need be said.